

REMARKS

By the foregoing amendments claims 36, 49 and 53 have been amended and claims 96 and 97 have been cancelled. Thus, claims 36, 49-53, 55-57, 62, 63, 67-78, and 98 are in the application.

Claim 36 was objected to in the Office Action because of an informality therein as noted in paragraph number 2 on page 2 of the Office Action. Responsive to the objection, by the above amendments the misspelling of the word "subarrangement" has been corrected.

Claims 36, 96 and 97 were rejected in the Office Action under 35 U.S.C. §102(e) as being anticipated by the newly cited patent to Wang, et al., U.S. 6,837,975 as stated on pages 3 and 4 of the Office Action.

Claims 49-51, 57, 62, 63, 67, 68, 74-78 and 98 stand rejected under 35 U.S.C. §102(e) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Wang, et al., U.S. 6,837,975 as stated on pages 4-6 of the Office Action.

Claims 52 and 53 have been rejected in the Office Action under 35 U.S.C. §103(a) as being unpatentable over Wang, et al., U.S. 6,837,975, as applied to claim 49, and further in view of Wang, U.S. 6,352,629. The patents are cited for the reasons and in the manner set forth on pages 6 and 7 of the Office Action.

Claims 55 and 56 are rejected in the Office Action under 35 U.S.C. §103(a) as being unpatentable over Wang, et al., U.S. 6,837,975, as applied to claim 1, and in further view of Chiang, et al., U.S. 6,398,929, as set forth on pages 7 and 8 of the Office Action.

Claims 70-73 are rejected in the Office Action under 35 U.S.C. §103(a) as being unpatentable over Wang, et al., U.S. 6,837,975, as applied to claim 69, and further in view of Chiang, et al., U.S. 2001/0050220. The references are combined in the manner set forth on pages 8-10 of the Office Action.

These rejections are hereby traversed and reconsideration thereof is respectfully requested in view of the above amendments to the claims and the remarks below.

By the above amendments the improved magnetron treatment chamber and method of manufacturing substrates with a vacuum plasma treated surface of the present invention have been further defined to include features in accordance with the invention as depicted in Figure 2 of the application drawings. That is, as recited in claim 36 as amended, the magnetron treatment chamber comprises a magnetron source including a target with a target surface and an opposite surface, said target being circular about a first center (A_s in Figure 2). A magnet arrangement is provided adjacent said opposite surface and has:

a) at least one first magnet subarrangement (5), at least a predominant part of said first magnet subarrangement being circular about a second center (A_L) distant from said first center;

b) at least one second magnet subarrangement (7a), at least a predominant part of said second magnet subarrangement being circular about said second center (A_L), outside said first magnet subarrangement and looping around said first center (A_s).

In addition, claim 36 as amended recites that the magnet arrangement of the magnetron source further includes a third magnet subarrangement (7b),

said third magnet subarrangement being located in an interspace between the periphery of said target and said second magnet subarrangement (7a), said third magnet subarrangement generating a magnetic flux superimposed upon said second magnetic flux. A sweeping arrangement rotating said first, second and third magnet subarrangements about said first center (A_s) is also provided.

The newly cited patent to Wang, et al., U.S. 6,837,975, relied upon alone or in combination with one of Wang, U.S. 6,352,629, Chiang, et al., U.S. 6,398,929, and Chiang, et al., U.S. 2001/0050220 in the rejections of the claims discloses an asymmetric rotating sidewall magnet ring for magnetron sputtering. In pertinent part, Wang, et al. is relied upon as disclosing in Figure 4 a roof magnetron 34 having a second magnet subarrangement 38 and a first magnet subarrangement 36. Applicants' claims as amended are clearly distinguished over Wang, et al., as the second magnet subarrangement 38 does not loop around the first center 14 as recited in Applicants' claims as amended. In this regard, Applicants note that whenever the first and second magnet subarrangement are conceived as now claimed by Applicants, there remains, as may be seen from Figure 2 of the application drawings, a moon-like interspace between the second magnet subarrangement 7a and the periphery of the target. In this interspace the third magnet subarrangement 7b is provided. As may clearly be seen in comparing Wang, et al's., Figure 4 or 6 with Figure 2 of the application specification, the arrangement as now claimed in claim 36 has significant advantages.

Namely, a significant part of the target is swept over by the first and second magnet arrangements, thereby inclusive of the center A_s according to

the present invention. Please note that the tunnel-shaped magnetron field is established between the second (7a) and first (5) magnet subarrangements, as may be seen from the upper part of Figure 2. In opposition thereto, the arrangement according to Figure 4 of Wang, et al. teaches to rotate the roof magnetron with the magnets 38 and 36 around the one center 14, which establishes a circular sputter track of the target. The central part adjacent to the axis 14 is not eroded, as may be seen from Wang, et al. Figure 1, where no magnetron magnetic field is present in the addressed central part. The present invention provides an improved average homogeneity of plasma density distribution over the substrate surface as compared with the prior art as noted at the bottom of page 4 of the specification.

The method of independent claim 49 has been amended to include similar distinguishing features of the invention. In view of these changes, it is believed that the claims as amended are clearly and inventively, 35 U.S.C. §102 and 103, distinct over Wang, et al., alone or in combination with any of the aforementioned secondary references. In this regard, the remarks distinguishing the present invention from each of the secondary references as set forth in the Amendment After Final Rejection filed August 28, 2008 are incorporated herein by reference. The magnetron treatment chamber of claim 36 as amended and the method of manufacturing substrates with a vacuum plasma treated surface of claim 49 as amended are especially suited for planar circular targets, in opposition to Wang, et al's cup-like targets, although the present invention is not limited to such a specific shape of the target.


In view of the above amendments and remarks, it is believed that the claims as amended are now in condition for allowance. Accordingly, reconsideration and allowance thereof is respectfully requested.

While Applicants have made a good faith attempt to place the application in condition for allowance with the above amendments and remarks, if the Examiner finds that outstanding issues remain in the application he is invited to telephone the undersigned with a view toward resolution of such matters in order to place the application in condition for allowance.

A Petition for Extension of Time is filed herewith to permit the timely filing of this Amendment.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (Case No. 635.43483X00) and please credit any excess fees to such deposit account.

Respectfully submitted,



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